



another less significant dogleg at 1600 ft bgs. Due to these 'doglegs,' the total deviation at the bottom of the drilled hole is 95 ft to the southwest. The total angle of deviation, from 300 ft to 1725 ft bgs, was calculated to be approximately 4 degrees. It was decided, based on the results of the deviation survey, that the total deviation and doglegs might not impose significant constraints on the installation of the well casing and that this operation should be conducted.

FINAL WELL CONSTRUCTION AND DEVELOPMENT

CASING, GRAVEL PACK, CEMENT SEAL INSTALLATION AND DEVELOPMENT

The final casing design for Well No. 2 was prepared by RCS geologists based on the geologic evaluation of lithologic samples, interpretation of electric log data, and drilling information provided by Cascade. The Final Recommended Casing Design Memorandum, which provided the final well design, was submitted to the Owner and to Cascade on September 21, 2006; a copy of this Memorandum is included in the Appendix. Figure 2, "As-Built' Well Diagram" helps document the recommended construction of the well.

During installation of the well casing, gravel pack and cement seal, Cascade encountered further difficulties. The following provides a short summary of events during final construction of the well:

- a) On September 24, 2006, the temporary tremie pipe used for the emplacement of the gravel pack and cement seal was installed to a depth of 1340 ft bgs. Shortly after completion of this task, installation of the well casing commenced.
- b) Casing installation was completed on September 26, 2006 to a depth of 1700 ft bgs. Following this, the drillers flushed the fluids inside the well casing with fresh water in order to thin down the drilling muds.
- c) Gravel packing of the annular space between the well casing and the borehole walls was initiated on September 27, 2006. However, shortly following this, the tremie pipe could not be pulled-back after 2 or 3, 20-foot long sections ("joints") had been removed. In addition, approximately 1500 ft of stainless steel sounding cable were lost downhole and could not be recovered. Subsequently, 1300 ft of tremie pipe and the stainless steel sounding cable were left downhole. A second set of temporary tremie pipe was installed to a depth of 500 ft bgs to resume gravel packing.
- d) Gravel packing was discontinued on September 30, at which time it was discovered that the top of the gravel pack in the annular space was at a depth of approximately 500 ft bgs. This depth was approximately 190 ft above the targeted 690-foot depth for the top of the gravel pack. The contractor was asked to remove 190 ft of this